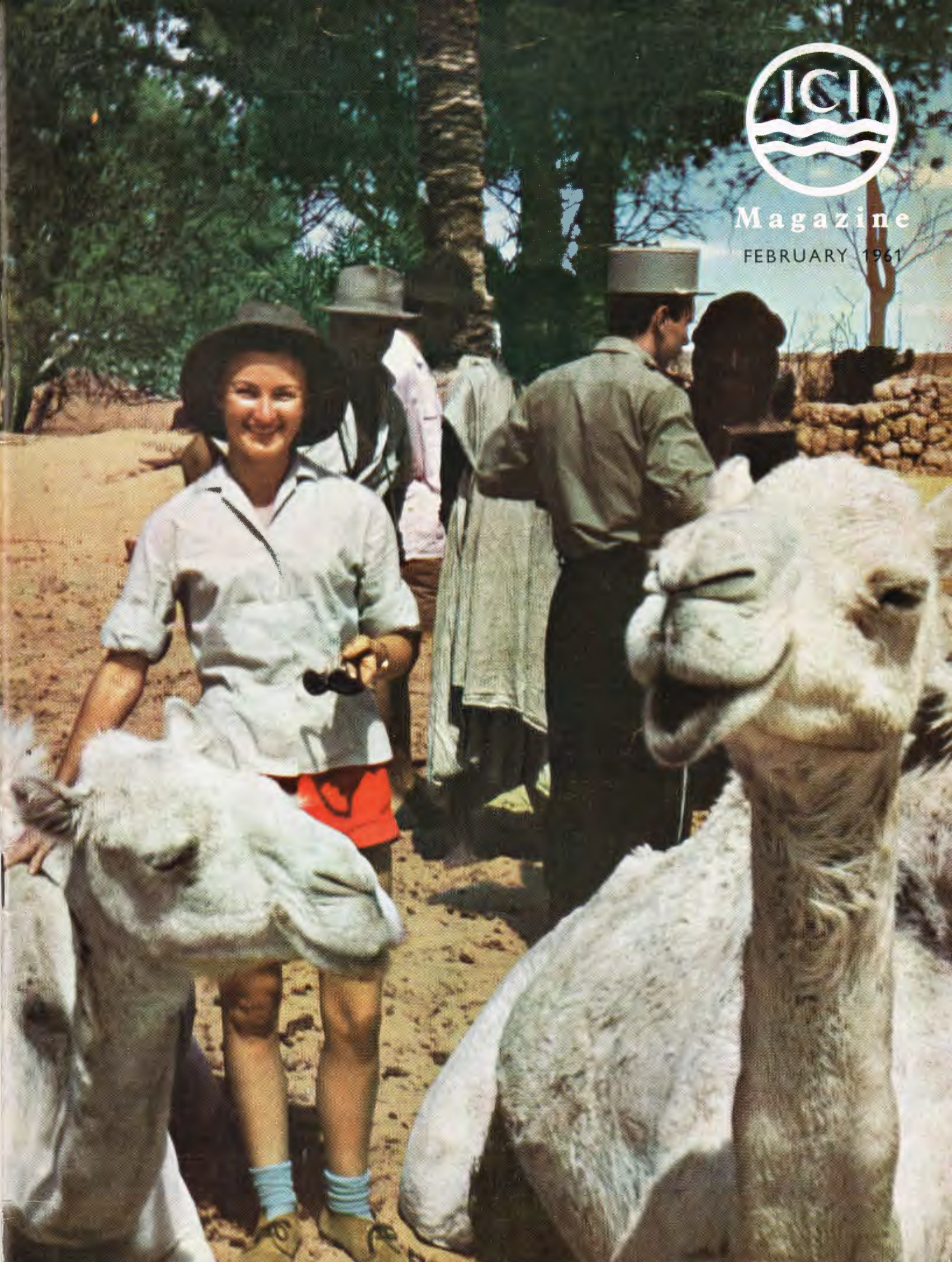

ICI

Magazine

FEBRUARY 1961

The *ICI Magazine*, price twopence, is published for the interest of all who work in ICI, and its contents are contributed largely by people in ICI. Edited by Sir Richard Keane, Bt., and printed at The Kynoch Press, Birmingham, it is published every month by Imperial Chemical Industries Limited, Imperial Chemical House, Millbank, London, S.W.1 (Phone: VICtoria 4444). The editor is glad to consider articles and photographs for publication, and payment will be made for those accepted.

VOLUME 39 NUMBER 290

The ICI Magazine

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Contributors

J. V. Danckwerts *retired as Managing Director of AE & CI (Rhodesia) Ltd. in 1952. He has extensive farming interests in the Salisbury area. He is chairman of the Southern Rhodesian Land Settlement Board, a national vice-president of the Southern Rhodesian Federation of Young Farmers' Clubs, a member of the Jockey Club of South Africa and a steward of the Mashonaland Turf Club.*

William T. Elwell *is Divisional Chief Analyst of Metals Division. Before taking up his present duties just over five years ago he was attached to the Analytical Laboratory of Billingham Division's Research Department. He is an assistant editor of "Analytica Chimica Acta," an international journal dealing with analytical chemistry, a member of the Publication Committee of "The Analyst" and a Fellow of the Royal Institute of Chemistry.*

H. S. Hirst *was appointed Joint Manager of Severnside Works just over two years ago and in January 1958 was made a member of Wilton Council. He joined what is now Billingham Division in 1926 and after three years was transferred to General Chemicals Division on its formation in 1929. During the war he was seconded to the Ministry of Supply as Director of Chemical Defence. A member of the original team responsible for Wilton, he became personal assistant to Sir Alexander Fleck in 1947. Two years later he returned to Billingham as Deputy Manager, and later Manager, of the Technical Department.*

Contents

FRONT COVER: *Camels resting at a watering place. This photograph was taken at a French military post in the mid-Sahara Desert by R. Wiid (late of Head Office)*

POINT of VIEW

TWO CHEERS FOR TEENAGERS

By Mark Abrams

We have in this country approximately five million young people who can be described as teenagers, that is, they have reached the minimum school leaving age of 15, they are under 25 years of age, and they are unmarried. In the past three or four years this 10% of the total population has received from the adult world a good deal more than its due share of publicity. Half a dozen special high-powered committees have reported on their behaviour, misdemeanours and problems; and articles and programmes about them seem to be always available in newspapers and on television and radio. Anyone who seems to know anything about teenagers has been deluged with invitations to make speeches on the subject to all sorts of conferences.

Some of the speeches have been made by me, and in the questions and discussions that followed them I have become aware of a fairly clear pattern of adult attitudes and misunderstandings about our teenagers.

Perhaps the biggest adult error about young people is that the latter are extremely prosperous. The facts certainly do not support this view. The average teenager, after paying income tax, State insurance contributions, putting aside a few shillings for savings, and handing over something at home for board and keep, is left with a little over £3 a week to meet all outgoings—clothes, shoes, confectionery, soft drinks, cigarettes, cosmetics, cinema and dance hall admissions, holidays, gramophone records, etc. And total teenage spending on the whole lot comes to less than what the adult world spends merely on cigarettes and tobacco. Average earnings for youths in industry of £6 a week, and for girls of £5 a week, can hardly be regarded as excessively generous in return for a 44-hour week.

A second and related misconception that many adults have is that when the school leaving bulge fully hits the labour market young people won't earn so much, won't be able to spend so much, will get a taste of unemployment—in short, will be put in their place.

These developments are very unlikely. It is true that from now on, because of the high birth rates of fifteen years ago, there will be a sharp increase in the number of school leavers looking for jobs, but I don't believe this will mean unemployment for them. The demand for their labour has been high ever since the end of the war and will almost certainly continue to be high. And the reason for this is pretty obvious. In an expanding economy some industries have to grow rapidly. Up to a point they can do this by attracting adult workers from other industries; but, by and large, adults are unwilling to change their trades, and therefore the expanding industries are largely dependent for their growth on their ability to attract a high proportion of young people. In short, the prosperous trades are always on the look-out for young workers.

This situation, incidentally, is one for which adults should be very grateful. Roughly, what it means is that economic advance in this country is made possible without adults having to do much in the way of changing their jobs. Instead they can stay put and place most of the responsibility on young people who are prepared to take the risks of going into new industries where supply and demand are still unsettled.

A third widespread misunderstanding among our adults is that teenage shortcomings are limited to this country. Nothing could be further from the truth. Today British young people seem to behave in much the same way as teenagers in Sweden, the United States, New Zealand, South Africa, France—and Russia. In every urbanised, industrialised country the spate of adult head-shaking about teenagers is in full flood. There is nothing especially peculiar about our lot.

And a fourth adult error is that nothing like this happened in the pre-war days. Honest adults with first-hand experience of working class young people of a generation ago must admit that this is just not so. A generation ago children leaving school had just as much difficulty learning how to be grown-ups, there was the same minority that turned to vandalism, stealing, and gang fighting during their adolescent years.

The main difference is that in those days their misbehaviour was largely dealt with privately—by the local policeman, the neighbours and parents; nowadays the same misbehaviour is largely handled publicly—by the press, social workers, youth leaders, and committees of experts. This may be a change for the good, but the publicity doesn't mean that we are dealing with something new; merely that we are trying to deal with something very old—the difficulties of growing from a child to an adult—in a new way.

The opinions expressed in this article are not necessarily those of the Company

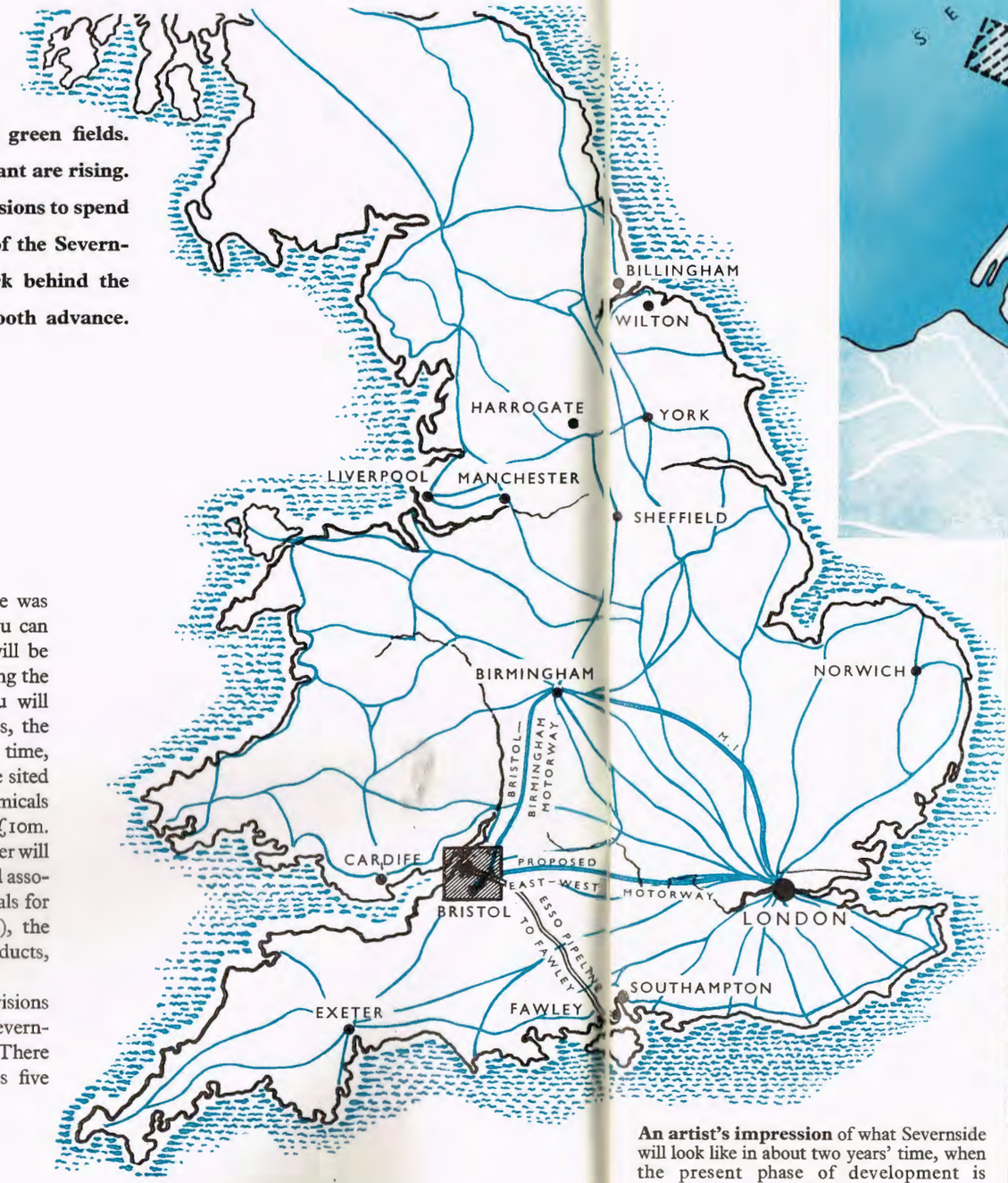
SEVERNSIDE PROJECT TAKES SHAPE

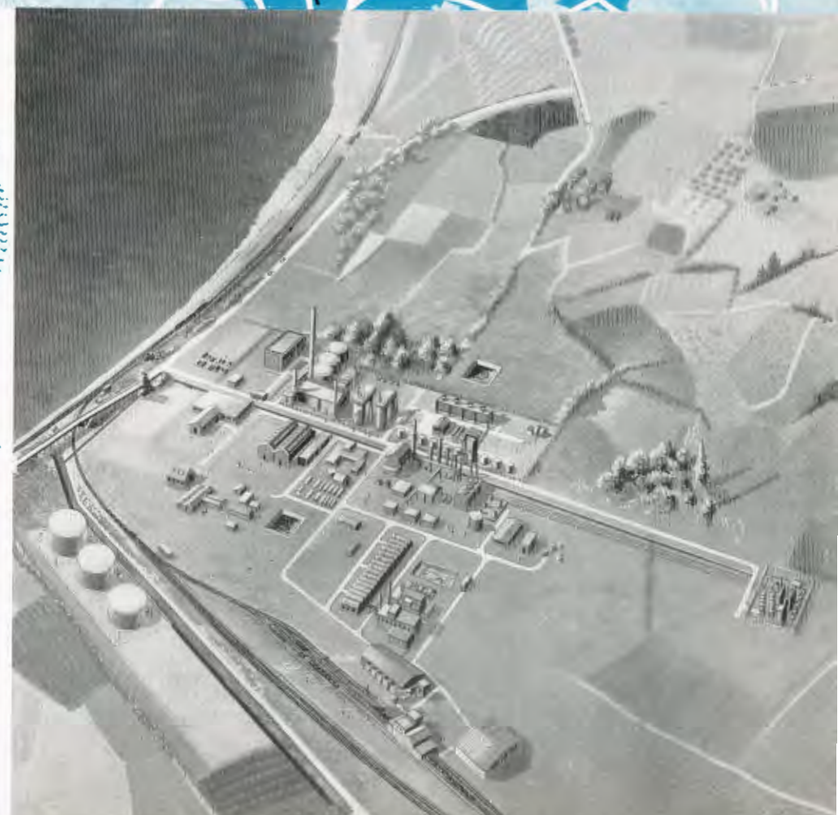
A year ago the Severnside site was just green fields. Today the first visible signs of chemical plant are rising. Progress has been rapid since the first decisions to spend over £15m. were made. Here the leader of the Severnside team reveals something of the work behind the scenes which is the foundation of a smooth advance.

By the Editor

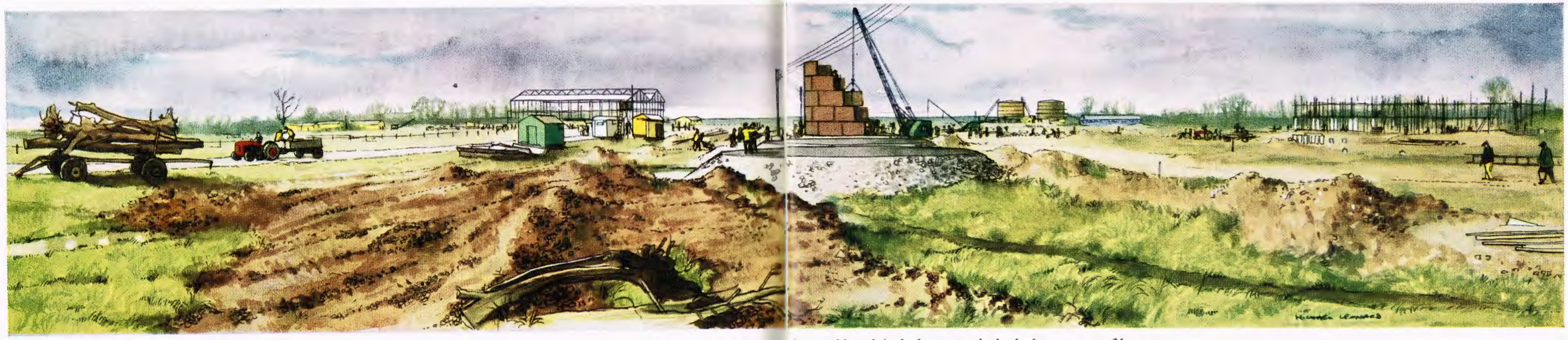
EIGHT months before I visited it, the place was just fields and the sea beyond. Today you can see the shape of things to come. Here will be the new roads; over there a group of huts housing the construction staff. In one small building you will find a map pinned against the wall: there it is, the Severnside Works as it will look in three years' time, with the plants of two ICI Divisions then to be sited there, the £5m. plant of the Heavy Organic Chemicals Division (due by the end of this year) and the £10m. project from Billingham (due in 1963). The former will be producing ethylene oxide, ethylene glycol and associated products (glycol is one of the raw materials for 'Terylene' and also is used as an anti-freeze), the latter producing ammonia and ammonia products, including fertilizers.

Within ten or fifteen years several ICI Divisions may have sunk their roots in the 2000 acres of Severnside, to the tune, it is estimated, of £100m. There will be 1000 workers there by 1963; perhaps five times as many in fifteen years.





An artist's impression of what Severnside will look like in about two years' time, when the present phase of development is completed



The first stage of from green fields to industrial site— Severnside as it looked to our artist in the late autumn of last year

The leader of the team at Severnside which is engaged on the general planning of this large project is 59-year-old Dr. Herbert Sim Hirst, a slim, grey-haired, quiet-spoken, Scottish-educated son of a Yorkshireman, a man with two vocations—his work, and golf.

With him I had the following conversation.

Editor: There has been quite a splash more than once in the papers over Severnside—headlines like "ICI to spend £100m. on new chemical plant"—but the story I would like from you is: what has to be done before chemical plant can be erected on land until recently used solely for farming? What does the preparatory work involve? How long does it take? Who has to be consulted? But first of all let's get you in focus, as Denzil Batchelor would say. Why were you chosen for this job?

Early Explorations

Hirst: That's quite a long story. You have to go back to 1954, when Billingham Division first started looking round for a new site. The idea was that fertilizers ought to be made somewhere that would be well placed to supply the expanding southern market and so avoid the heavy transport costs involved in sending fertilizers from the north of England. I and a few colleagues were given the part-time job of finding a suitable new site.

While this search was still proceeding, early in 1956 a sub-committee of the Main Board, with Mr. C. Paine as its chairman, was set up to investigate the future development plans of the Company as a whole. One of the particular points they were to examine was the need for another large ICI site like Wilton. This committee was immediately informed of the work done by Billingham, and I am glad to say that they agreed with the progress to date.

Editor: What were your conclusions at this stage?

Hirst: Briefly, after consideration of about half a dozen possible locations we narrowed the choice to a short list of two: the Severnside site ultimately selected, and another which is now being developed by another company.

Process of Elimination

Editor: How did you get the number down to two?

Hirst: It is really just a process of elimination. First of all we had to have a good site geographically. It had to be well placed to serve the south of England, to counterbalance the preponderance of our plants in the north. Then it had to have good road and rail communications. Next, it must be near a port where oil tankers could be berthed, and also be well placed to buy bulk supplies of electric power as cheaply as possible. Lastly—and by no means least—it must be somewhere with a plentiful, or potentially plentiful, water supply. Oh, and one other essential matter which probably I should have mentioned first, there has to be somewhere to discharge large quantities of storm water and treated trade effluent, which in practice means being either beside the sea or near a river estuary.

Editor: Quite a formidable list of requirements! Nevertheless, there is one I expected you to mention and didn't—availability of labour. I would have expected you to look for a site in an area of under-employment.

Hirst: That is a point I have heard made before. But in fact modern chemical plants employ comparatively few people in relation to their size. It is expected that for every £20,000–£30,000 of capital spent only one man on the payroll will be required. In siting a large chemical works, the other considerations I have listed are of paramount importance if the costs of products made are to be competitive in export markets. After full consideration of the facts put before them the Board of Trade gave us the appropriate permission. The site selected is near Bristol, where some half a million people live.

Planning Permission

Editor: You mentioned the Board of Trade. How do they get involved?

Hirst: They come in very early indeed. You see, you can't nowadays just go and develop an industrial site where and when you like; you must first get a Board of Trade Industrial Development Certificate. And that is only the beginning. You then have to go to the appropriate local authority and get planning permission from them.

Editor: But what is the good of getting planning permission if you don't even know if you can buy the land?

Options to Buy

Hirst: We got round that difficulty by obtaining options to buy. As soon as the Board of Trade gave the okay on the Severnside site, ICI Estate Department went into action. Working through agents to avoid publicity at this early stage, options were obtained on some 2000 acres in one block. Over fifty different owners were involved, and they were all asked to let us have an option to buy at prices agreed there and then with them. There was, of course, a definite time limit on the options, but it was arranged that these options could be taken up at a number of successive dates. Each owner received a cash payment for the option, and I am glad to say we were able to reach acceptable terms with all.

Editor: What about the foreshore? Who owns that?

Hirst: We own it on a frontage of about 1500 yards and out as far as the middle of the River Severn. We bought the rights from the Duke of Beaufort. Across the mudflats, which are uncovered at low tide, it would be feasible to run pipes to discharge the effluent from the various plants into the middle of the estuary, but first the agreement of the Severn River Board and of other authorities has to be obtained.

Editor: There seems to be a lot of negotiations with authorities of one sort or another.

Hirst: Yes. Such negotiations are an essential part of any new site. At an early stage we made a list—and this list is by no means short—of the various bodies locally and nationally we had to approach. We have found them all most helpful and co-operative.

Editor: Let's go back to the point in your story after you got planning permission from the Gloucestershire County Council towards the end of 1957. What came after that?

Main Board Approval

Hirst: Well, first of all we got busy doing further detailed site exploration work and by the end of 1958 had satisfied ourselves and Wilton Council—which is the delegate board responsible for both Wilton and Severnside—that the site was suitable for development. Wilton Council then recommended development of the site to the Main Board, who gave their approval. After that what we wanted was for a Division to come along with a plant to be built on the site. But we had to wait a little.

Editor: Why was that?

Temporary Setback

Hirst: Well, I expect you remember that a bit of a trade recession occurred in 1958. A number of products which had been expanding rapidly levelled off in demand. This provided both the time and the opportunity to re-appraise expansion plans, including some that were in view for Severnside. Special consideration was given to the planning of Severnside, and the Board decided that, although it would be appropriate to reduce a little the size of the staff at Severnside, the work must continue. It was clearly recognised that a recession only temporarily deferred these plans. Events have shown this action to be extremely well judged. Development work went ahead, and when the Divisions came up with requirements for new plant—Heavy Organic Chemicals was the first at the end of 1959—it was possible to accommodate them at once because of the groundwork already done.

Editor: You talk about groundwork. What sort of work was this?

Hirst: The sort of unspectacular work which is nevertheless basic to the economic development of a large site of the trading estate type. Tests had to be taken of the subsoil. A drainage scheme for both storm water and trade effluent had to be worked out. The problem of getting suitable foundations for plant on this low-lying alluvial land—below the level of the sea at some high tides—had to be solved. We worked out what type of piling would be needed and how much these special foundations would add to overall cost. The answer was: surprisingly little. Above all we had to go more deeply into the question of where we could get our water. There were two possible sources—the River Severn via the Sharpness Canal or the River Avon. Negotiations were entered into with the Bristol Waterworks Co., and it was eventually settled to take River Severn water via the canal. This has meant the promotion of a Private Bill before the House of Commons jointly by Bristol Waterworks Co. and the British Transport Commission.

Editor: I believe you were concerned with the early development of the Wilton site. Have you done some things differently at Severnside?

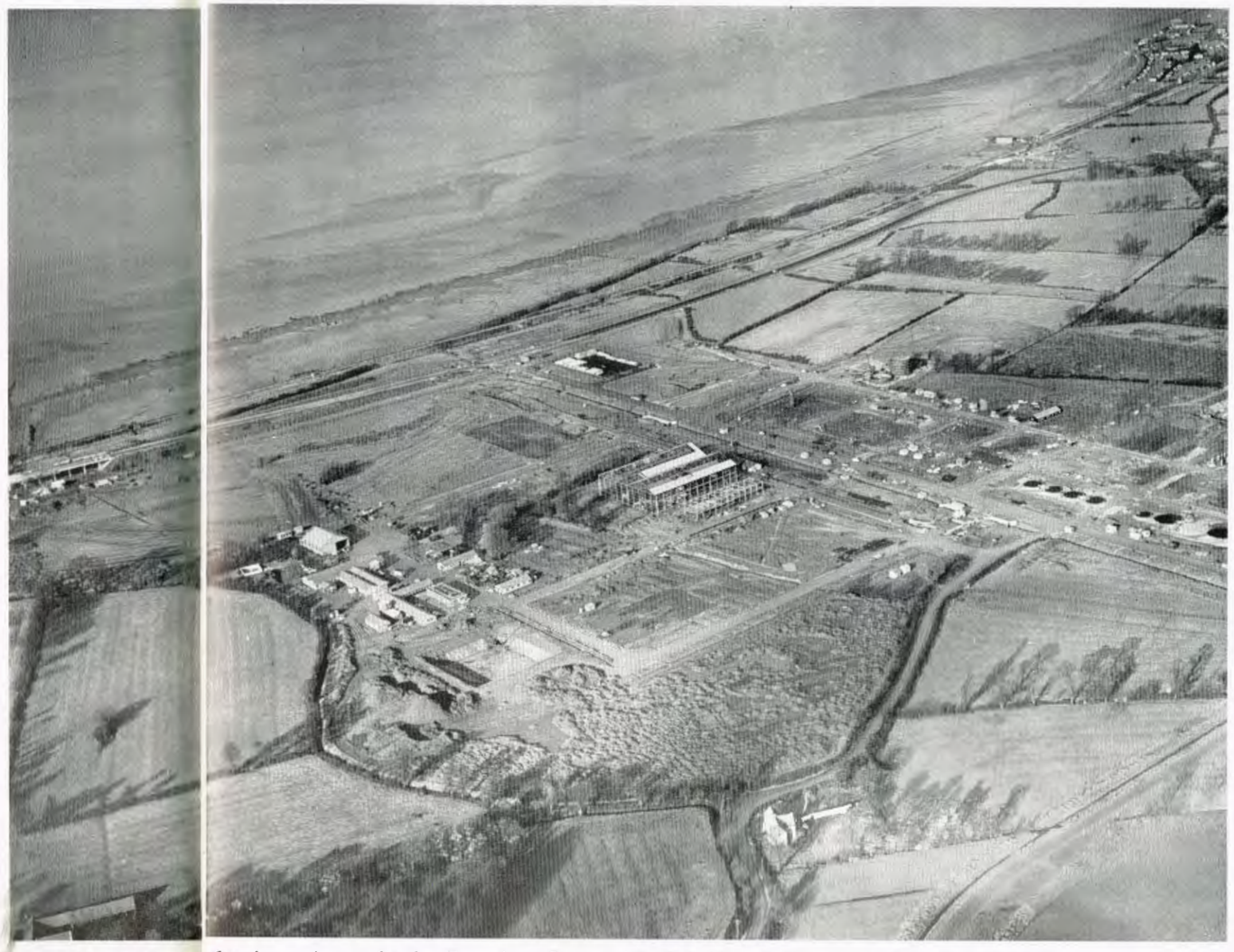
Hirst: Of course, quite a few things are different because circumstances are different and because one always learns from experience. Wilton came just after the end of the war. Today the range of engineering services outside the Company that can be called on is much greater than in 1946. But then you had to have your own detailed design team, for example, because it was just not possible to contract out all the work involved. Moreover there was a big backlog of development, and a lot of future capital expenditure on plant could be forecast with a high degree of certainty. This atmosphere led to an enthusiasm to build an entirely new type of chemical works, one which would be a shining example in years to come. I think we can all be proud of that achievement.

In today's highly competitive conditions an attempt is being made to approach all the problems of site development and provision of services, taking full account of all the experience gained at Wilton and by other companies abroad. We plan to give special attention to the phasing of our services expenditure and to step it up stage by stage as new plants bring new demands. Thereby we hope to keep unused capital down to a minimum.

One of the changes that helps us in this is that the net steam requirements of a modern petrochemical site—such as Severnside will be—are expected to be relatively small. It is therefore preferable to make chemical plant steam using small oil-fired boilers and to buy the power—at least in the early stages. So there will be no large power station at Severnside for the time being.

Some other things, too, have been done slightly differently in the light of experience and of the particular site conditions at Severnside. Service pipes run at ground level, dipping where necessary under roads. And storm water is catered for separately from trade effluent. The water is drained first of all into buffer reservoirs

(*Continued on page 49*)



Severnside seen from the air—a picture taken last December. Construction of a bridge over the railway to carry the new road bypassing the site can just be seen on the left. In the centre is the Severnside workshops building under construction

People and events . . .

ICI's New Rights Issue

THE main news last month was about ICI's new "rights" issue announced by the Chairman, **Mr. S. P. Chambers,** at a special press conference at Imperial Chemical House on the evening of 16th January. A "rights" issue is where existing shareholders are offered an opportunity to purchase further shares, usually at a price less than the prevailing market price. In this instance one new £1 Ordinary share is offered for every £20 Ordinary Stock or part thereof held, and the price is 55s. per share. (The closing price on the London Stock Exchange on the day of the announcement was 65s. 6d.) The official documents offering the new shares to stockholders are being sent out on 24th February.

Employees who hold Ordinary stock acquired under the Profit Sharing Scheme have exactly the same rights as any other stockholders. If you plan to buy the extra shares now offered, the first 20s. instalment on each share is due by 17th March and the remaining 35s. by 12th May.

The amount the Company expects to raise by the issue is about £34 million, and these additional cash resources are required because of the Company's large capital expansion programme, which includes a number of major projects such as development at Severnside, at Kilroot in Northern Ireland ('Terylene') and at Wilton (polypropylene).

* * *

Since the war ICI has spent about £535 million on new plants and buildings (including extensions and alterations to existing assets), in providing additional working capital, and on further investments in subsidiary and associated companies. Of this sum only about £125 million has been raised by cash issues of unsecured loan stocks and Ordinary shares including Ordinary shares issued to employees under the Profit Sharing Scheme. The rest has been found from within the Company from retained profits and other sources.

* * *

The 1960 Dividend

At the press conference Mr. Chambers announced that the Board of Directors expect to be able to recommend a final dividend for 1960 on each £1 unit of Ordinary stock of 1s. 6d., which, with the interim dividend of 1s. 3d. already paid, will make a total Ordinary dividend of 2s. 9d. compared with 2s. 3d. for 1959. He also said that the Board believes that the Company's prospects are such that it will be possible to maintain the 1960 rate of dividend on the Ordinary share capital as increased by the present issue.

What the Papers Said

Every national newspaper (with the exception only of the *Daily Worker*) gave prominence to the news of the Company's share issue.

The *Financial Times* said the issue "seems certain of a good reception, although more as a result of its relatively modest size and the accompanying dividend forecast than as a result of the terms themselves. These—one for 20 at 55s.—have been pitched right up to the market."

The *Daily Mail* did not deny itself the pleasure of pointing out that the terms were "exactly as forecast in this page last Thursday," and went on to advise ICI stockholders to take up their new shares if they could afford them. "The long-term growth prospects of the Company seem to me to be as good as ever."

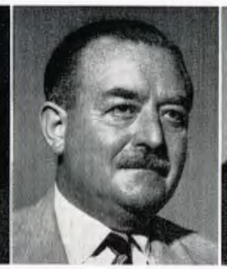
The *Daily Herald* headed its announcement "ICI's Boom Year—Workers get bigger cuts." The *Daily Express*, too, referred to the estimated profits for the past year, which they described as "fabulous," and urged all shareholders to take up their new shares. On the announcement that the dividend would be increased and the Chairman's forecast that the dividend would at least be maintained on the extra capital this year, they said "That is cool optimism. Mr. Chambers is a man with faith in the future of industrial Britain." The *Evening Standard*, which headed its report "ICI Quickens the Pace," considered that ICI had "given a shot in the arm to the stock market."

New Year Honours

THE names of five ICI people appeared in the New Year Honours List. **Sir Alexander Fleck,** immediate past Chairman of ICI, has been made a baron. He is currently chairman of the Minister of Power's Advisory Council on Research and Development and of the Nuclear Safety Advisory Committee, and last November was elected treasurer of the Royal Society.

Mr. Ernest Parker, a director of ICI (India) and head of the Bombay branch, becomes a CBE. His award is for service to the UK community in India. **Mr. James Black,** works manager for the past twelve years at the ammonia factory which Billingham Division operates for the Government at Mossend near Glasgow, and **Dr. Leslie Burrage,** administrator at General Chemicals Division's Widnes Research Laboratory, both received OBEs. Dr. Burrage gets his decoration in his capacity as deputy chairman of the North West Regional Advisory Council for Further Education. **Mr. Donald Malcolmson,** personnel and development manager of the Nobel Group of ICIANZ, received the MBE for services to social welfare and charitable movements in the State of Victoria—he was chairman of the Victorian appeal for World Refugee Year.

Sir Alexander Fleck



Mr. E. Parker

Mr. J. Black

Dr. L. J. Burrage

Mr. R. D. Malcolmson

Five Million

SINCE the war eleven ICI factories have at some time completed over two million hours without a lost time accident, but until last August none had managed to smash the all-time ICI record of 2,871,970 set up by a Nobel Division Works back in 1935. The employees of Castner-Kellner Works (General Chemicals Division), the factory which eventually did so, have been going from strength to strength ever since. They completed three million hours by the end of the same month. This led to the introduction of two new Company safety awards, a silver medallion (for two million accident-free hours) and a gold medallion (for three million). By the time they actually received the medallion (at Central Council in November) they had added another million to their record, and last month, on 15th January, they successfully topped the five million mark. Their record run ended two days later at 5,039,263 hours.

Tough Test

THE child's tricycle of 'Propathene,' featured in our picture pages last month, stole the show at Plastics Division's exhibition of polypropylene products which opened at the Manchester Building Centre on 10th January.

To show the strength of polypropylene, the *Manchester Evening Chronicle* (10th January) and the *Daily Mirror* (11th January) took photographs of a girl riding the tricycle, while the *Daily Mail* (11th January) went one better and featured their 15-stone industrial reporter, John Chartres, on the tricycle. BBC (Television) News showed a film of heavy men standing on the tricycle and also a polypropylene suitcase. BBC (Sound) News interviewed **Mr. W. R. Davis,** a deputy manager of Plastics Division's Sales Control Department, on the exhibition.

New-style Braille

FOR the hundred years and more since the invention of the Braille alphabet it has been printed by embossing dots on strong, thick paper. Now after several years of research and experiment the Royal National Institute for the Blind has perfected a new method of printing. It consists, briefly, of baking dots of pvc on to paper.

This means that in future thinner paper can be used, which will reduce the thickness of a braille volume by half. (The Bible in traditional braille runs to 72 volumes.) The new system of printing is cheaper, and the Institute will, as a result, be able to increase considerably its already large annual production of 600,000 newspapers, books and periodicals. Most important of all, it is easier to read than the old braille, since it is not worn down so quickly by constant fingering.

Along with several other industrial firms ICI has played an important part in perfecting the new method of printing. To make the solid dot method a practical proposition, a reasonably cheap plastic paste was needed which would fulfil the following almost contradictory requirements.

It had to be fluid enough to pass without trouble through the pipes and pumps of the printing machine, yet stiff enough for the dot not to run when stencilled on the paper, but not so stiff that it formed a sharp tail on the dot. The pvc paste that is now used as the special "ink" is the result of several years' development work by Plastics Division.

Emergency Air Lift

NEARLY 23 million tablets of ICI's drug 'Sulphamezathine' were flown out to Nigeria in a specially chartered plane which left Prestwick

Loading some of the 23 million 'Sulphamezathine' tablets rushed to Nigeria

on 12th December. This consignment, the largest ever sent as one shipment, was ordered by the Crown Agents acting for the Nigerian Government. The tablets were manufactured and packed into tins at Pharmaceuticals Division's Regent Works near Linlithgow.

Dr. A. S. Haigh, works manager of Regent Works, had this to say about the order:

"The first intimation of the order at Regent Works was a telephone call from Distribution Department on Monday, 5th December. We were asked to do what we could, and as quickly as we could, towards packing 17 million tablets. About 6½ million tablets were already packed in the warehouse. We had available about 16 million, some of which were in process of manufacture. While most of the tins were in stock at Regent, we had to depend on Supply Department delivering the outstanding quantities with the minimum of delay.

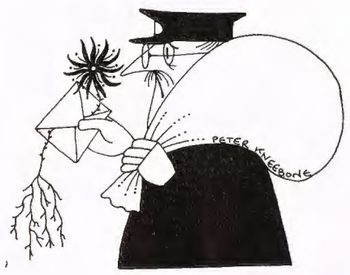
* * *

"The week's programme in our packing room had to be scrapped and replanned at a moment's notice to enable the order to be completed in time. Fortunately everything clicked, the tablets in process coming forward without a hitch and the packages being delivered from Manchester on time. The outstanding million tablets were delivered in the following week.

"There is no doubt that everybody concerned at Regent—and this includes the planning section as well as the operators on the lines—did a wonderful job; they were told what the order was about and they accepted the situation as a challenge."

Growing Rare Plants

EACH year members of the Royal Horticultural Society and the Alpine Garden Society get the opportunity of selecting uncommon seeds sent in from all over the world. One such enthusiast is Mrs. Eileen Webb, wife of **Dr. W. W. Webb,** Production Director of ICI (Hyde). "It becomes a thrilling occupation," she writes, "deciding what to ask for, and even more



exciting to tear open the envelopes and see if one has been lucky enough to get all one's first choices."

It is not a hobby for the impatient. Occasionally the seed germinates quickly, but more often than not nothing shows for months. A lucky save recently was a pan of *Lilium szovitsianum,* a native of the Caucasus, that had shown no sign of life for a year. Just as she was about to discard it, she spotted some tiny bulbs. It will take several years, however, before the plants reach flowering size.

Among recent "successes" are five healthy plants of a rare Himalayan gentian, *Gentiana kurroo,* grown last year, which she hopes may grow to flowering size by next summer. Disappointments are frequent, she warns. A bird decided that the only seedling of *Aquilegia scopulorum* (from North-West America) grown from the packet was a delicious morsel. On occasions, too, uncommon weeds have had care and attention lavished on them by mistake.

IN BRIEF

Wallpaper Bid. On 2nd January ICI acquired the entire issued share capital of the Rochdale Wall Paper Printing Co. Ltd. of Roach Vale Mill, Rochdale, Lancs. This company went into voluntary liquidation on 31st January, and its Roach Vale Mill is now part of the Withins Paper Staining Co. Ltd. of Radcliffe (another subsidiary company of ICI) and is continuing in full production.

Fleck Awards. The first four prize-winners under the Fleck Award Scheme are **Miss Jeanne Mallinson** (Dyestuffs Division), **Gerald Ramshaw** (Metals Division), **David Sandick** (Billingham Division) and **J. Eric Trembath** (Nobel Division).

Mr. W. D. Scott, ICI Commercial Director, is a member of the new Western Hemisphere Exports Council, which has replaced the old Dollar Exports Council. The chairman is Lord Rootes.

Apprentices' Successes. Five of the first six diplomas in the whole country awarded by the Association of British Chambers of Commerce under its apprenticeship scheme started in May 1957 have gone to Billingham commercial apprentices. They are **Roger Bland, Robin Clough, Peter Glover, Alan Hudson** and **Paul Whitaker.**

Printers' "Oscar." The Kynoch Press, which prints this magazine, has been awarded one of the "Oscars" of the printing trade. Each year *The Printing World* invites printers from all over the world to submit samples of their letterpress work for evaluation. Awards go to the top ten, and this time The Kynoch Press was on the list.

Polythene Price Cuts. The price of 'Alkathene,' ICI's brand of polythene, has been reduced by 4d. to 1s. 10d. a lb. This is the fourth cut in price since September 1958 and represents a reduction of 33% in two years. ICI's polythene production capacity in Britain has now reached over 100,000 tons a year.

Technical Training Week

A FEW years ago, on one of his visits abroad, the Duke of Edinburgh found the Australians running what they called a State Apprenticeship Week, the object of which was to impress on parents and young people the value of specific training for a job in industry. The Duke was so impressed that on his return to this country he put forward, in his capacity as president of the City and Guilds of London Institute, the suggestion that similar weeks should be held simultaneously throughout the whole Commonwealth.

The result is Commonwealth Technical Training Week, which is being held in this country at the end of May. Similar weeks will be held in many other parts of the Commonwealth at or about the same time. All forms of training for employment will be demonstrated during the Week, including training for apprentices, operative training, training for commerce and for agriculture, induction training, and training for the professions. Local civic authorities will be organising such events as open days in technical colleges, visits to local industries, careers exhibitions, exhibitions of work done by students at technical colleges, schools or firms, and also sporting and social functions.

Most of these activities—works open days, local careers exhibitions, prize distribution ceremonies, sports days—are a normal part of ICI life. This year, however, the Company will be arranging for these functions to take place, wherever possible, between 29th May and 4th June. The Divisions and Regions are co-operating with local organising committees, and programmes of local activities will be advertised in due course.

Reorganisation at The Frythe

CHANGES in the organisation of Akers Research Laboratory, set up fifteen years ago to carry out general long-range and fundamental research, were announced last month.

The two main activities of the Laboratory—research on microbiology (with the associated research in organic chemistry) and research in inorganic chemistry—will from now on be the responsibility of Pharmaceuticals and Heavy Organic Chemicals Divisions respectively.

Dr. P. W. Brian, who has been made an associate research manager of the Pharmaceuticals Division, now has charge of the work at Akers for this Division and is also in general charge of the laboratory. **Dr. Joseph Chatt** continues in charge of the Inorganic Chemistry Department and is appointed a group manager of the Research Department of Heavy Organic Chemicals Division.

APPOINTMENTS

Some recent appointments in ICI are: **Fibres Division:** Mr. J. C. Stewart, Senior Assistant Sales Manager, Home Sales Division. **Head Office:** Mr. V. M. Robson, joining Secretary's Department to be responsible for the Legislation Section. **Metals Division:** Mr. H. Baskerville, Export Metals Sales Control Manager. **Nobel Division:** Mr. D. G. Justham, Secretary. **The Regions:** Mr. G. T. Cubitt, Personnel Manager, Southern Region. **Alkali and Chemical Corporation of India:** Mr. C. A. Pitts, Managing Director (jointly with Mr. J. M. Lall). **Indian Explosives Ltd.:** Mr. J. W. F. Aitken, Director.

RETIREMENTS

Some announcements of senior staff retirements are: **General Chemicals Division:** Mr. C. W. Richards, Deputy Manager, Technical Service Department (retired 31st December). **Pharmaceuticals Division:** Mr. J. W. Snowdon, Division Assistant Accountant (retired 31st December). **The Regions:** Mr. G. W. Marshall, Personnel Manager, Southern Region (retired 31st January).

50 YEARS' SERVICE

The following employees have completed 50 years with the Company: **Alkali Division:** Mr. L. Hough, Construction Works, Winnington (1st January); Mr. G. Martin, Middlewich Works (1st January). **Metals Division:** Mr. D. Davies, Kynoch Works (31st December).

CORRECTIONS

In the article on Musical Boxes in last month's *Magazine* the captions to the illustrations on the first two pages were wrongly positioned. The caption on page 32 should have referred to the bottom illustration on page 33, the caption attributed to this to the top illustration, and the caption for the latter to the block on page 32.

In some copies in this issue Dr. H. S. Hirst has been wrongly described as Joint Manager of Severnside Works. This should read General Manager.

SEVERNSIDE PROJECT TAKES SHAPE (*continued from page 45*)

and thence pumped to the Severn. Because of the reservoir, pumping capacity does not need to be up to the peak level of the storm water. And the effluent because it is discharged separately, needs correspondingly smaller pipes.

Editor: Earlier in our talk you described the Severnside project as a sort of trading estate. Could you elaborate this?

Hirst: The similarity to a trading estate is because there is a central organisation whose function is to provide agreed services to manufacturing Divisions who own and operate their own plants on the site. We propose to provide a service centrally only if it is the cheapest way of doing it from the Company point of view. For example, we are not supplying the first HOC plant with steam. They are raising it themselves and prefer things that way. And we intend to phase our development as far as possible in such a manner that at no time will Divisions be asked to meet service costs for which they are not getting full value in return. We hope to see a lot more Divisional plants at Severnside. Billingham, for example, has followed up HOC with a £10m. ammonia and fertilizer plant on which construction work will start this year. And there are other projects in the offing.

HOW WOULD YOU DETECT ONE ROGUE ATOM IN TWO MILLION?

By W. T. Elwell, Metals Division Chief Analyst

Unless you are an expert, you won't know the answer to this question. But the principles of modern metallurgical analysis are in themselves both fascinating and simple, and reflect a spectacular advance in the last decade. The principles are here explained in a brief glimpse into the modern approach of analytical chemistry to the newer metals.

About the middle of the seventeenth century, ale testers served the community in much the same way as the tea taster does today, and one of the "analytical" tests they used is particularly interesting. Part of the ale sample was poured on to a wooden seat, upon which the expert sat, clad in leather breeches. If his breeches tended to stick to the seat when he attempted to rise, the presence of added sugar was assumed.

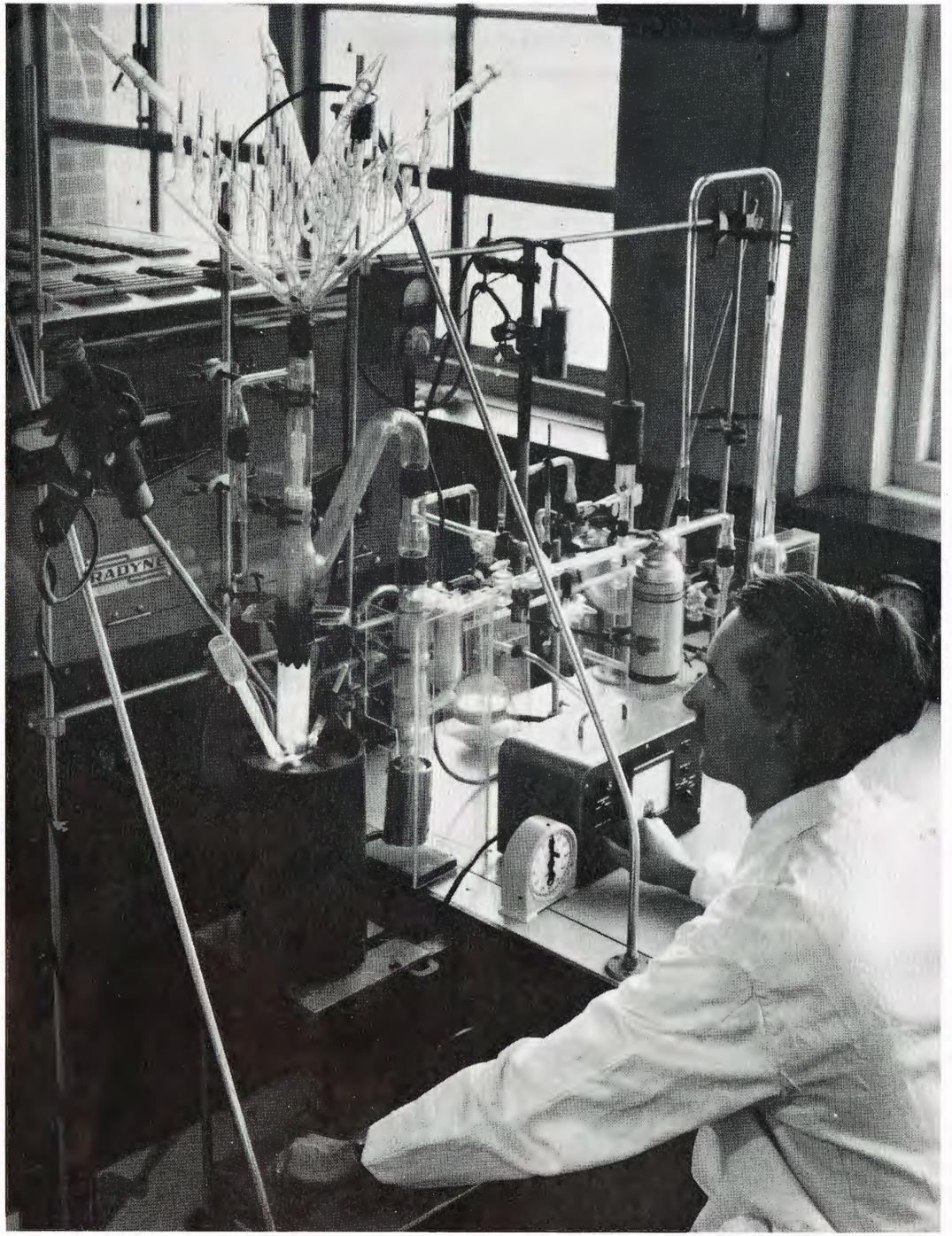
In 1861 a lecture given to the Society of Arts alleged that 74% of the milk and 87% of the bread sold in London was adulterated to some extent. It is not surprising, therefore, that the Adulteration of Food and Drugs Act was passed in 1872 to safeguard the public against such dishonest practices; in the same year local authorities were compelled to appoint a public analyst.

There is little on record about the systematic testing of metals until about a century ago, when the assaying of bullion was introduced. The whole business was suspiciously "hush-hush." Each assayer had weights with private markings indicating their values, and used balances with complicated and exclusive mechanisms. Results were reported as better or worse than standard.

To record the progress of analytical chemistry since then, and particularly over the past 25 years, would be an interesting if lengthy exercise, but the foregoing examples give a background to the early scene, providing a marked contrast with the state of affairs today. In place of the man with leather breeches and the assayer with a pair of scales (reminiscent of a well-known Shakespearean character) we see a modern laboratory with a team of highly skilled technicians, clothed in white coats and using chemical balances capable of weighing to a millionth of an ounce with a high degree of accuracy. A wide variety of delicate scientific instruments are also among the tools of their profession.

In the early 1930s the metallurgical analyst might have been regarded as someone who merely supplied routine information on the basic composition of commercial alloys, but, with the trend towards metals of higher and still higher purity, this is certainly not so today. Specifications are now far more stringent, and very precise methods of analytical control are essential if products of a consistently high quality are to be made available on a commercial scale. This demands not only the systematic analysis of production samples but a constant search for more rapid and accurate analytical procedures, including the introduction of new instrumental methods whenever these can be used with advantage.

Many intricate problems have emerged in recent years to test the analyst's skill, and those associated with the new metals have been among the most formidable. Until a few years ago the metals beryllium, hafnium, niobium, tantalum, titanium and zirconium were of little commercial interest, but within a comparatively short time they have



A vacuum fusion apparatus for determining gases in metals. This equipment is used for the analysis of the newer metals like titanium and zirconium. The sample being analysed is dissolved under great heat in molten platinum in a vacuum and the resulting gases are collected for analysis. Very small quantities of oxygen and hydrogen present in these metals can thus be detected and measured

achieved startling prominence, and each, together with its corresponding alloys, poses peculiar problems to the analyst.

New demands by New Metals

Several of these "new" metals are used as materials of construction in nuclear engineering and, as such, are exposed to abnormal conditions, especially when used in the canning of uranium fuel or for other components located at the heart of a nuclear reactor. The presence of certain impurities in some of these reactor metals, even in amounts bordering on the infinitesimal, seriously reduces their efficiency, so rigid specifications are imposed. An example of the complex analytical work involved is given by a typical specification for reactor grade zirconium, which includes maximum limits for more than one-third of the total number of common elements known to man. These analytical problems are made more difficult by the fact that many of the impurities must not exceed a few parts per million, with limiting values set at one part in two million for each of the elements cadmium and boron. It will be appreciated, therefore, that here the analyst is confronted not only with finding the proverbial needle in a haystack but, once it has been found, with determining its weight in relation to the haystack.

How does he ensure that products conform to these very high standards? Briefly, he uses all the devices that his predecessors and contemporaries have evolved to establish the ratio of atoms of the element to be determined to atoms of the parent metal.

New use of Old Idea

Highly technical names are given to some of the modern apparatus used, but in principle several have been known to man for a long time. Procedures involving flame photometry and emission spectrography, for example, originated with the work of Bunsen and Kirchhoff over a hundred years ago.

One of the latest innovations in the analytical laboratory is an instrument called an atomic absorption spectrophotometer. Light of a chosen wavelength is passed horizontally through the flames produced by a series of small burners; at the same time a solution of the sample is injected into the flame, and this hinders, or absorbs to some extent, the passage of light. This form of absorption was known as early as 1832, when the dark Frauenhofer lines in the sun's spectrum were shown to be due to this phenomenon.

Metals Division was probably the first industrial concern to buy such an instrument in order to assess its potentialities, and already it is being used to determine zinc down to one part of metal in ten million parts of solution. There are also encouraging signs that use of this instrumental method can be extended to the determination of some other metals when present in about the same order of magnitude.

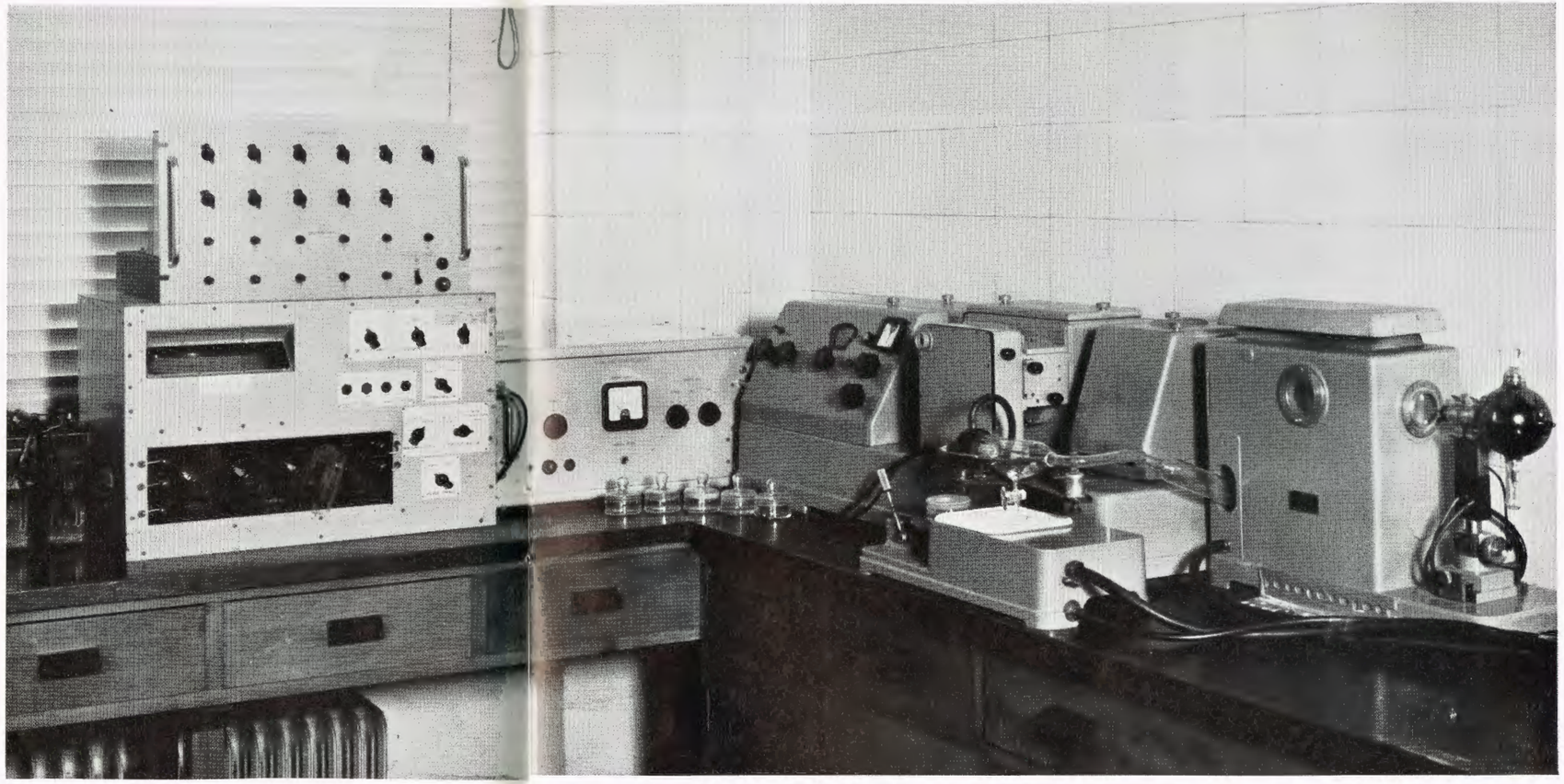
It may seem hard to believe that, to determine oxygen and hydrogen in zirconium, a bath of liquid platinum must be used. Platinum melts at about 1800° C., and the operating bath temperature is about 2000° C. When the weighed sample is transferred into the platinum bath a reaction takes place between the sample and carbon (from the graphite crucible) dissolved in the platinum; the gaseous products are collected in a highly evacuated system and then analysed.

One of the most exacting tasks of the contemporary analyst is the determination of one part of boron in two million parts of zirconium. This necessitates conditions of cleanliness associated with those of surgery. The analyst's main concern is that the chemicals (or reagents, as they are called) used in his laboratory must be of a very high degree of purity, and boron is one of the elements invariably present in all these reagents and in ordinary glassware. Associated with other elements, boron is often present in detergents and in some types of hair cream, so these domestic commodities are both potential sources of serious contamination—particularly if the spruce young analyst, clad in a freshly laundered lab coat, polishes his apparatus in the traditional way before a day's work.

In this analytical procedure the weighed sample, contained in a platinum vessel, is dissolved in a strong acid, and boron is converted into a volatile substance by the addition of alcohol, then distilled from apparatus made of quartz. The determination is completed by a very delicate colour test involving the use of curcumin (obtained from the root of the East Indian plant *curcuma tinctoria*, which also provides the distinctive flavouring of curry).

So much for the past and present, but what of the future? Already considerable attention has been devoted to the subject of continuous monitoring, a form of instrumentation which provides an almost instantaneous answer to a chemical problem. At the present time this form of analytical control is restricted in its application, but already the composition of some of Metals Division's copper products is controlled "simply" by feeding in the sample at one end of an apparatus and translating the typewritten information supplied at the other end a few minutes later.

No Research Department would be functioning efficiently if it failed to keep an eye on current trends and possible developments. Future magazine articles on the subject of metallurgical analysis will undoubtedly include references to instrumental methods of analysis at present in a very early state of development, and eventually all analytical chemistry will be summed up in three words: "complete continuous monitoring."



An atomic absorption spectrophotometer. This instrument can detect very small impurities in metals. The principle is that light of a chosen wavelength is passed through a flame into which a solution of the sample under analysis has been injected. Impurities will then show up as variations in the amount of light passing through the flame

MR. WILTON

Interviewed by Denzil Batchelor

It was Lord McGowan who, when Wilton Works opened in 1949, gave it as his opinion that the place would become a centre of modern chemical industry to which the world's scientists might well make a pilgrimage. So it has proved: and that is the reason that Osborne Pascoe Grenfell has the job of reception officer for 37½ hours a week to act as host to anything up to 5000 visitors a year.

He explains and interprets, in general terms rather than scientific detail, the vast enterprise: the tasks of the six Divisions—Plastics, Fibres, General Chemicals, Dyestuffs, Billingham and Heavy Organic Chemicals—in the £165,000,000 works covering 600 out of the 2000 acres of industrial site. When Grenfell got the job in 1954 (after being a plastics salesman for ICI for twenty years, less war service in the Army), he knew virtually nothing about almost everything.

The first team of visitors he entertained were BBC foreign correspondents. He had to explain Wilton and all its works to them: and the shadows of the oil cracker were not very long that evening before he realised, in fear and trembling, that he must re-educate himself from the beginning. He chose the ideal way. He spent long periods with members of the managements of all the Divisions, picking up know-how with every breath he drew. As a result, today he is able to give a full general explanation of all the processes in use at Wilton.

In equipping himself to do this he made contact-men in every branch, so that today when a party of experts from Korea or Chile or Japan descends on Wilton to learn all about the use of hydrocarbon gases for the supply of raw materials for the manufacture of plastics, he does not have to bother the hard-driven works manager but knows where to find the appropriate contact-man to give approval for a facility visit.

* * *

In effect, he finds himself faced with an average of two or three visits a day: some of one or two experts, some of parties of thirty or more.

The job of acting as host to the callers at Wilton is an entirely professional undertaking. The callers cover a fairly wide cross-section of the population, and include members of the local women's organisations (such as Women's Institutes, Townswomen's Guilds, etc.) who may be the wives, mothers and sweethearts of the men who work at Wilton. Many of the schools in the neighbourhood bring parties of their senior boys and girls to look over the factory. On Tees-side it is not surprising, therefore, that Grenfell has come to be known with some affection as "Mr. Wilton."

"All visits are completely buttoned up," Grenfell explains, "and programmes are arranged down to the final details, a week in advance." Except China, pretty well every country in the world has sent its quota of experts to the Works. Grenfell speaks French to those who need it —during the war he was dropped over France to serve with the Maquis—for all other languages he finds interpreters among the 2500 staff or 8500 payroll workers. ("Fortunately technical language is pretty international," he adds. And by *international*, he means English. The French for *polythene* and for *para-xylene* are the English words, pronounced with a French accent.)

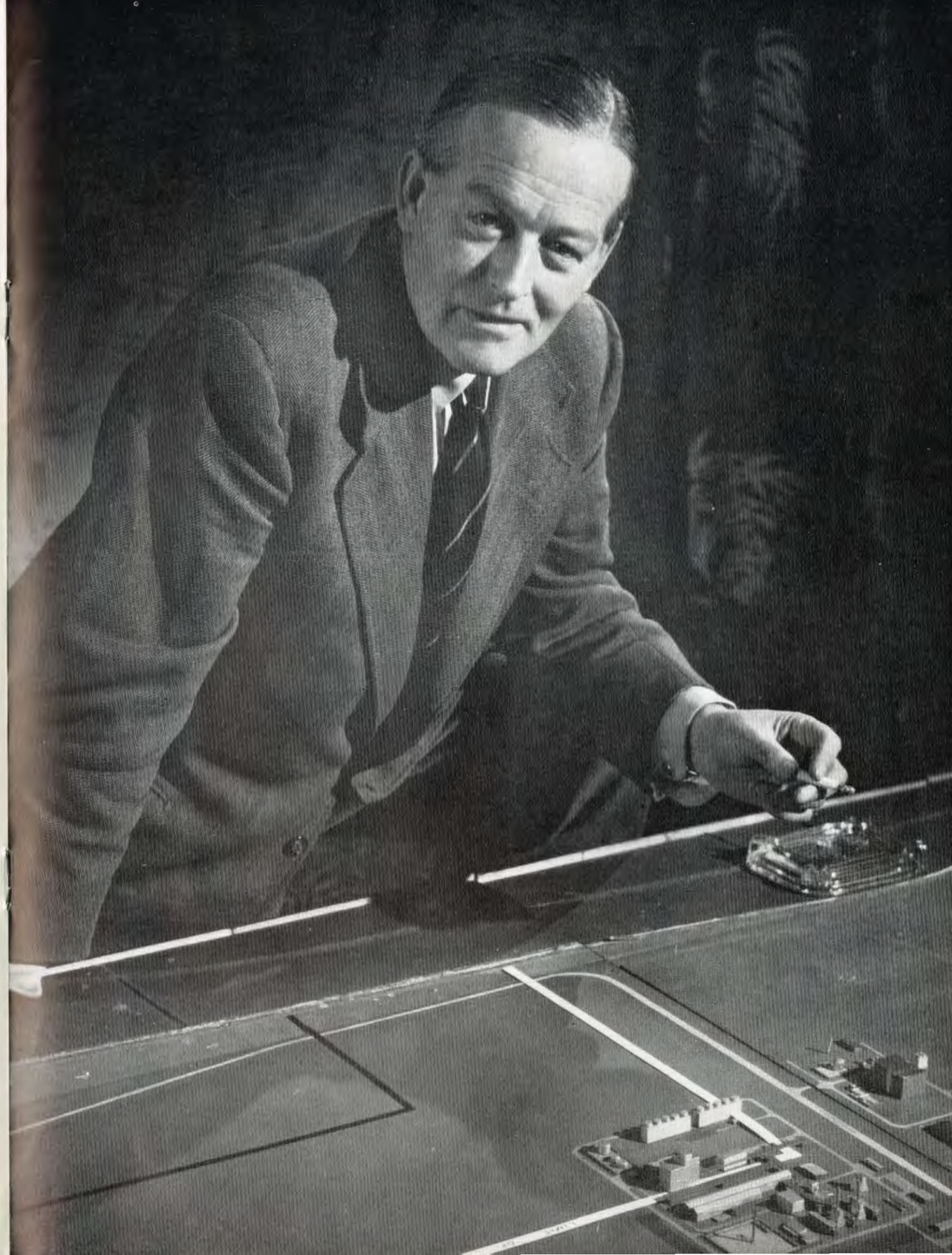
* * *

To keep abreast of scientific information he reads all the appropriate technical magazines as well as ICI's *Daily Information and Instruction Bulletin*, irreverently known as *Comic Cuts*. This gives him a general picture of scientific information already released, to be supplemented by a repository of news from the various Divisional works managements.

And the questions he is asked: *How much coal is used at Wilton?* That's a simple one—more than a thousand tons a day. *What's the capacity of an oil feed-stock storage tank?* One shipload: eight thousand tons of oil.

The prize question? Perhaps it comes from the ladies: *When do we see the carpets made? They* are *at Wilton, aren't they?*

A particular aspect of the job which appeals to Grenfell is meeting the famous people who come to Wilton. The Queen and Duke of Edinburgh made a visit in 1956. Cabinet Ministers, leading industrialists, doctors, trade union officials, lawyers—the list is formidable, the variation interminable. Lord McGowan's prophecy is indeed being fulfilled.

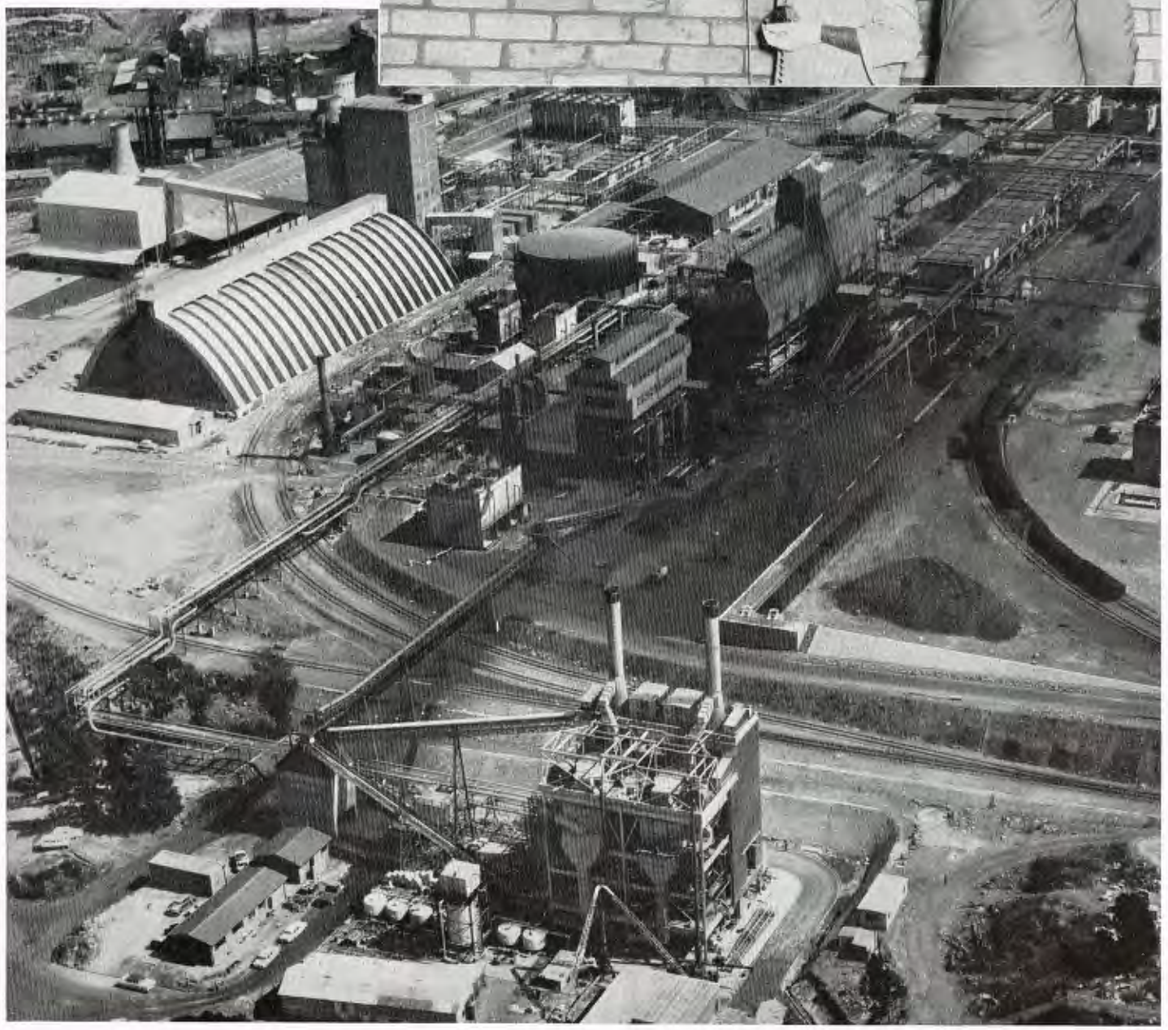


Osborne Grenfell

NEWS IN PICTURES

Home and Overseas

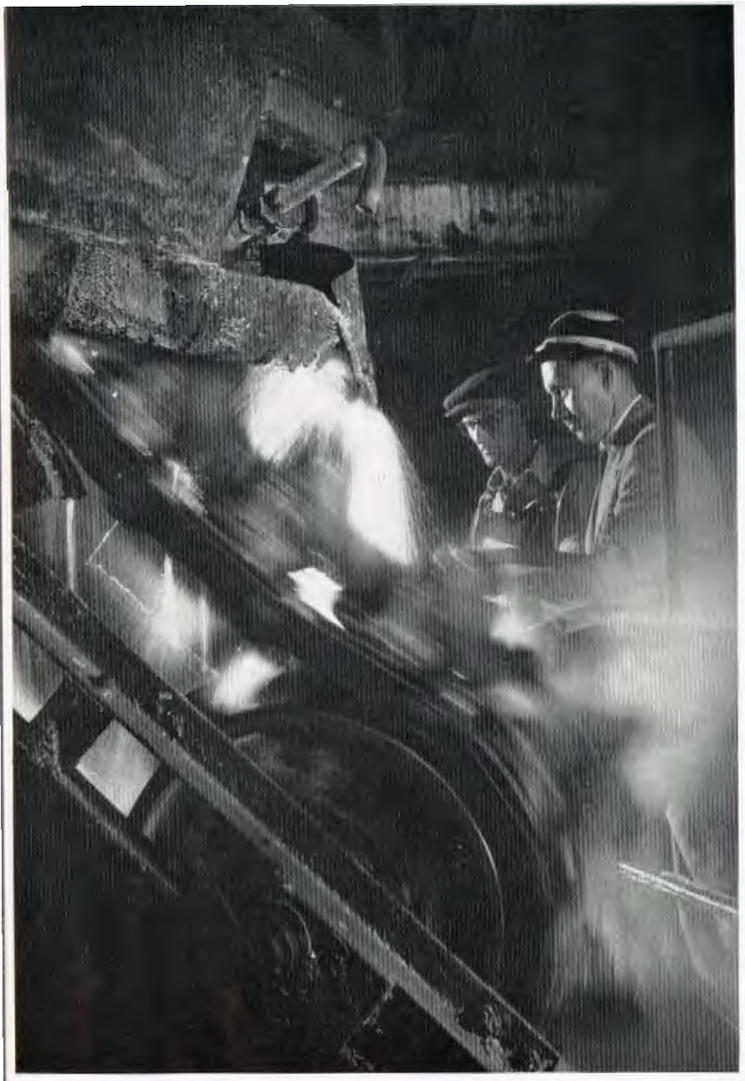
Nitrogen project. Mrs. H. F. Oppenheimer (*right*), wife of AE & CI's chairman, unveils the plaque which commemorates the official opening of the nitrogen project at Modderfontein Factory. The project, costing nearly £10m., includes this urea plant (*below*), which will eventually provide another 50,000 tons per year of nitrogen, nearly doubling the factory's capacity

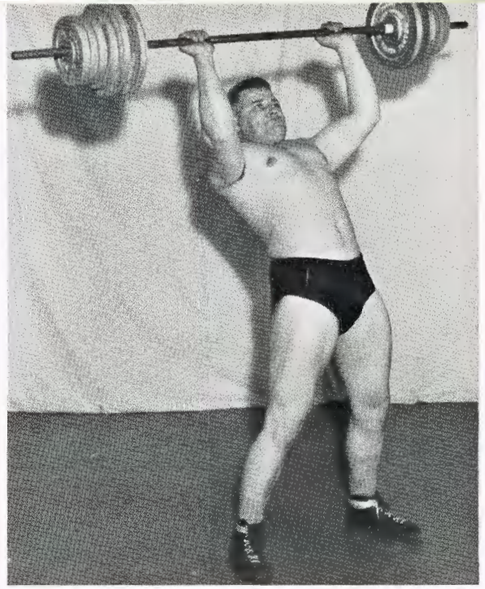


Trans-Canada Highway. CIL Explosives Division provided 88% of all explosives used on the recently completed Trans-Canada Highway project. Here Messrs. Bruce Stovel (*left*) and Fred Tremblay of CIL congratulate each other on the completion of the job in front of the giant Canada goose statue which symbolises the new freedom brought to the 4500 inhabitants of Wawa, Ontario, and nearby hitherto isolated communities

Pillion passenger. Mr. R. C. Todhunter, overseas director, made an informal arrival at ICI House, Melbourne, when he visited Australia in December. His son Tim, of ICIANZ Plastics Group, drove him there on his scooter for a day of business discussions

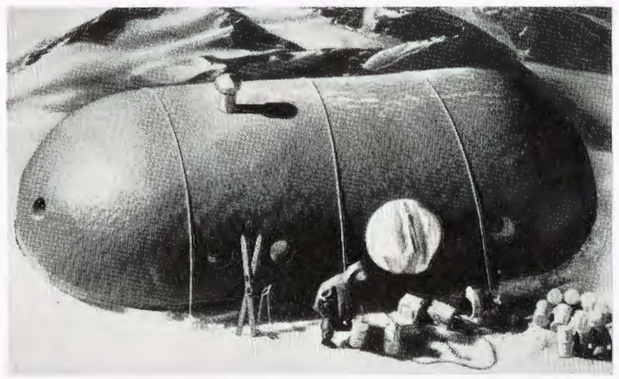
Productivity Conference. Mr. Russell Currie, head of Central Work Study Department, flew to Delhi just before Christmas to take part in a conference of Indian industrial leaders (sponsored by India's National Productivity Council) at the invitation of the Indian Minister for Industry, Mr. Manubhai Shah. He is seen here (*second from the right*) with (*from the left*) Mr. Lal Bahadur Shastri, Mr. Pandit Nehru, the Indian Prime Minister, Mr. Shah and Mr. C. R. Wynne-Roberts, of the ILO



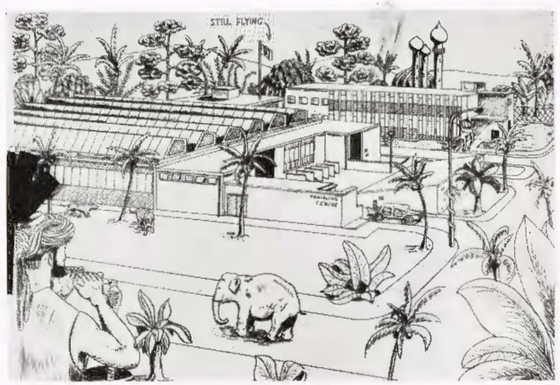


Man of Iron. Mr. Derek Moule of Metals Division started weight-lifting when he was twenty-one. Ten years later he became winner of last October's All-Midland Counties Strength-set Championship and has gained many other awards. In addition he is coach of the weight-lifting section he started a year ago at ICI's Summerfield Research Station, which now boasts 40 members who meet three times a week

Mechanised waterfall? No, this photograph taken by Maurice Broomfield is from a series entitled "Spotlight on Industry" which appeared in the *Evening Standard*. It shows a machine at Alkali Division's Winnington Works which helps in the production of sodium silicate—more commonly known as waterglass. Silicate is used to make soap and detergents, for concrete treatment, and as an adhesive in cardboard and carton manufacture



House of foam. Dyestuffs Division have enabled P. Frankenstein & Sons (Manchester) Ltd. to develop a remarkable permanent building which can be erected in three hours. The basis is a fabric envelope, say of 'Terylene' or nylon, which is inflated and sprayed inside and out with liquid ingredients, supplied by Dyestuffs Division, which form a polyurethene rigid foam "house"



Timely reminder. Mr. N. E. Langdale, who was Wilton Works education officer when he was seconded last April to the staff of the new College of Engineering, Delhi, received this novel "Wilton in the Jungle" Christmas card thought up by Training Centre personnel and drawn by 16-year-old apprentice Geoffrey Kitchen

Home for Christmas. Seagoing members of Nobel Division do not often see their pictures in the *Magazine*. Here some of the men of the *Lady Anstruther*, one of the Division's cargo boats which transport explosives, wave in greeting as the ship berthed at Garnock Wharf on 22nd December

General Sir William Morgan, who has been Defence Adviser to the Company since October 1951, relinquished this appointment at the end of last year. He saw distinguished service in both world wars and at his retirement from the Army in 1950 was Commander, British Army Staff, Washington. He will be greatly missed from ICI Civil Defence activities, in which he took a keen interest

Bronze medallists. In recent national Royal Society of Arts Shorthand Typists examinations, four bronze medals went to members of General Chemicals Division. The winners were (*left to right*) Miss Sheila Wilson with two medals, Miss Thelma Davies and Miss Daphne Broadbent

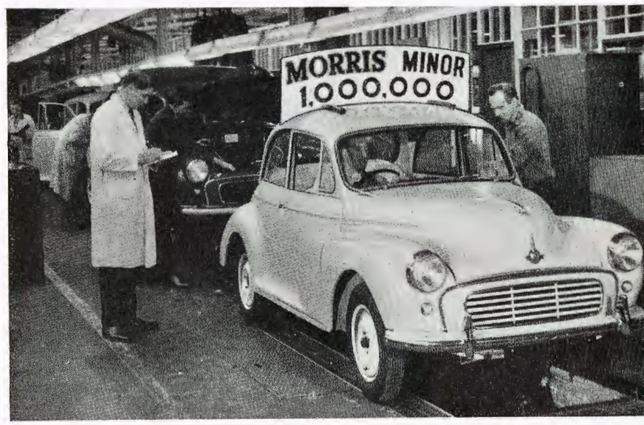
Toys galore, sweets and cash gifts were collected by members of Site Maintenance Sections 1 and 2 and the Lifting Gear Section of Wilton Works for the children of the Adela Shaw Orthopaedic Hospital. Here the Matron receives them from some of the Wilton contributors

Family affair. At Wilton Works swimming gala Mrs. Audrey High, representing Dyestuffs, won the Wilton Swimming Section ladies' championship and had the novel experience of receiving the Apprentices Cup from her mother, Mrs. Robins, wife of Mr. T. A. Robins of 'Terylene' Works

Winter evening at Huddersfield. This beautiful night scene of ICI's Huddersfield Works was taken by a local amateur photographer (not an ICI man) with an 820 Ensign Selfix camera, Ilford HP3 film, 1 sec. at *f*5·6. Huddersfield Works, which covers some 250 acres, is Dyestuffs Division's largest factory and the largest chemical works in the Commonwealth engaged solely in the manufacture of organic chemicals. Over 4250 people are employed in this Yorkshire factory making a wide range of dyestuffs and allied products, which include 350 parent colours and 1000 mixtures used for colouring all types of textile fibres, leather, straw and felt for hats, paper, foodstuffs, plastics, rubber, concrete, etc. Isocyanates for polyurethane foams, fibre-forming polymers, synthetic resins for paints, varnishes and linoleum, antioxidants for the rubber industry, and agricultural chemicals such as seed dressings and pest control products are also made there

The knitters. Miss Maureen Pinkney (*left*) of Billingham Division's Works Relations Section, displays the first of three blankets she made for local hospitals, from knitted squares sent in answer to an appeal in *The Billingham Post*. With her are women employees in the 'Nitro-Chalk' Packing Shed, who have helped by making hundreds of the multi-coloured squares

First batch. The very first batch of polypropylene filament yarn was prepared at Fibres Division Research Department for despatch to fishnet manufacturers at the end of December. Here Messrs. E. Walker and T. Farrand with Messrs. N. Lund and R. Wray, machine operators, examine a bobbin of yarn



Millionth Morris Minor. Two ICI products have been used for 350 "special" Minor 1000s produced to celebrate the British Motor Corporation's millionth Morris Minor. These are Paints Division's Lilac Car Finish, and vanilla-coloured 'Vynide' from ICI (Hyde) Ltd.

World War Against Horse Dopers

By Denzil Batchelor

Doping of horses is a menace almos as old as racing itself. But perhaps never has that menace been more a cute than today, with drugs freely available and a big weight of mon ey in the betting ring. A three-man committee of enquiry has been set up by the Jockey Club. One aspect of the problem they are bound to consid er is what is done in other countries.

The Duke of Norfolk's Skymaster, a winner at Ascot last year, was subsequently a surprise failure in a race in which he started favourite. The Duke instigated tests, and the horse was found to have been doped

You dope to win: you nobble to lose. Those mainly responsible for the former malpractice are unscrupulous trainers in a small way of business; nobbling is generally engineered at the behest of a tiny minority of dishonest bookmakers. It is calculated that perhaps twenty of the 4800 flat-racers in training may have been nobbled last season. All the nine cases reported to the Jockey Club were in fact brought to light by private tests carried out by trainers.

Nevertheless the Duke of Roxburghe, then Senior Steward of the Jockey Club, pointed in June to the nobbling of fancied horses in the middle of the season, among the victims being the Duke of Norfolk's Skymaster at Ascot and Lady Rachel Davidson's Red Letter at Kempton Park.

But the major menace is doping to win: a practice capable of ruining British racing. It is a precise and terrible form of chicanery. You can expect a horse in a mile handicap, if given benzedrine, to improve his form by some three to four lengths, thus making a mockery of the handicap. If classic horses are doped, the damage is, of course, even more serious: if undetected, it must cause winners to earn an inflated prestige which will have an effect on future breeding, since the finest mares will be sent to stallions whose reputations have been unfairly earned. It should, of course, be further remembered that the physical effect of doping or nobbling is liable to be extremely serious to the victim, which may take many months to recover.

A committee convened by the Jockey Club, consisting of the Duke of Norfolk; the retired High Court Judge, Sir Laurence Byrne; and Dr. W. R. Wooldridge, scientific director for the Animal Health Trust, is now sitting to consider the whole problem of detecting the use of drugs on racehorses "tending to affect their speed." Its report may be expected in March.

They have no simple problem to solve. There are racing men of long experience who would affirm that they could not determine what is a legitimate tonic and what is illegal dope. Several tonics contain strychnine or arsenic and are sold with the advice that they should not be used just before a race. One Yorkshire trainer was warned off because a test on a horse he started at a Scottish meeting showed 1/10,000th part of a grain of strychnine.

There are even horses that have quite innocently become victims of doping. A recent example was Narvik, one of the best horses in Brazil, where all placed runners are tested for dope. Narvik was disqualified after a race in September, when tests proved he had been given caffeine. Investigation established, however, that the drug entered his bloodstream from a liniment habitually used by the stable.

Doping—and particularly nobbling—are old tricks. Ratan, a favourite in the 1844 Derby in which the "ringer" Running Rein was first past the post, was undoubtedly doped to lose. But in modern times George Lambton, thrice leading trainer, with Derby winners Sansovino and Hyperion to his credit, was the first to prove to the Jockey Club that horses lacking in heart respond readily to stimulating drugs. He considered that the menace—begun, he insisted, in the United States—first became serious in English racing around 1900: within three years it had increased rapidly.

By 1920 saliva tests were applied to suspect horses in French racing, the drugs to be sought including cocaine, arsenic, strychnine, heroin and kola.

Throughout the past four decades the activities of both dopers and nobblers have multiplied. There were blow-darts at Newmarket in 1954; there was the acid-spraying epidemic of 1946 (Lord Mildmay

THE THREE-MAN PROBE

THE DUKE OF NORFOLK
Jockey Club Steward

SIR LAURENCE BYRNE
Retired High Court Judge

Dr. W. R. WOOLDRIDGE
Ph.D., M.S.C., F.R.C.V.S., F.R.I.C.

TOBACCO

By J. V. Danckwerts

Tobacco is big business in Rhodesia. To grow first-quality leaf—and it is first-quality that brings the money—you need to acquire know-how and to work hard. But rewards are big and initial capital is small. Here in fascinating detail is a full story of tobacco culture.

THERE are over 3000 registered growers of flue-cured tobacco in Rhodesia, who grow an average of 60–70 acres each. This compares with an average crop of under 4 acres in the United States and of about 15–20 acres in Canada.

The reason for this is that land and labour are cheap and plentiful in Rhodesia, but men with the ability and capital to undertake tobacco production are still relatively few. Thus the crop is grown almost entirely by European owners, often with European managers and African labour. For the same reason there is still a remarkably short ladder for men of ability to climb from the rank of learner-assistant to manager, and from manager to owner, accumulating their capital as they climb.

However, more and more Africans are proving themselves able to hold jobs that were once considered beyond their ability. While it seems unlikely that many will rise to the ranks of owners, it is certain that more and more will take on positions requiring managerial ability. The Government is actively promoting the introduction of Turkish tobacco culture to African farmers as well as to Europeans, and Africans are finding Turkish a profitable and convenient cash crop. Turkish tobacco should have a big future for Africans in Rhodesia, as its capital requirements are low.

Rhodesian flue-cured tobacco is grown mainly on the sandy soils derived from granite that cover nearly half of the country. It is also limited to areas with an annual rainfall of about 25–35 in. and to altitudes of about 3000–5000 ft. Because most of the rain falls in the four midsummer months, temperatures are considerably lower in summer than might be expected for a country lying wholly within the tropics. Temperatures are also reduced by the altitude, so that Salisbury with an altitude of 4800 ft. has a record high temperature of only 96° F. The climate, which is delightful, has been well described as cool, with a hot sun.

The farms are large, often over 3000 acres in extent, but increasingly the large holdings are being subdivided into units as small as 500 acres, as the amount of unoccupied land decreases and the population rises. Most new farmers have had to build up their farms from virgin bush often miles from railhead. This usually entails making hundreds of thousands of bricks for the construction of the essential curing barns and sheds. But good crops have been able to pay for these developments in a very few years, and it is inspiring to see the developed farms and prosperous communities that have been established since the war in what were previously unproductive and practically uninhabited areas.

Given land, labour and capital, the next important requirement for growing tobacco is know-how. In this Rhodesia is exceptionally fortunate. About ten years ago the growers themselves took over the responsibility for research, which had been done until then in a rather haphazard and academic manner. As a result of a small levy on all sales of tobacco the newly constituted Tobacco Research Board was able to spend money on men and facilities to increase greatly the tempo of research. This was combined with a vigorous drive to popularise the new findings, and the result has been a revolution in tobacco growing during the last eight years. Yields have risen from an average of 500–600 lb. per acre to a record yield forecast of 980 lb. per acre in 1960. They will go on rising.

Seedbed. Science plays a big part in the early stages of a tobacco plant's life. On the most advanced farms seedbed soil is fumigated with methyl bromide under plastics covers. Later the seedlings are sprayed weekly with a copper sulphate spray

Excellent extension services are provided by the Research Board, by the Department of Conservation and Extension, and by agronomists attached to the fertilizer companies, so that even inexperienced growers can get the best possible advice at any time without direct cost to themselves. One result has been that fertilizer applications in terms of nutrients per acre have trebled in about four years, and whereas previously growers spoke of so many pounds per acre of "mixture A or B," not knowing quite what those mixtures meant, they now converse confidently in terms of pounds per acre of N, P, K and MgO. The confidence of big industry in the agricultural future of the Federation is shown by the modern £4m. fertilizer factory recently built by AE & CI (an associate of ICI).

Tobacco production is a skilled occupation in so far as it involves numerous processes and operations from seedbeds to sales, each of which requires a certain knowledge and skill and experience in management if it is to be well done. That every operation should be well done is extremely important, since neglect at any stage can badly affect the return. When the costs of producing tobacco are £100 or more per acre it is imperative that the return be good. The costs are high, but so are the potential profits. Therein lies the fascination and the incentive. (With average yields and prices the return per acre is about £130—but that can be increased to £200, or even £300, with a good crop.)

A seedbed of 30 square yards is usually provided for each acre of tobacco to be grown, and that requires only one-tenth of an ounce of seed—or one teaspoonful. The beds are made up and sterilised during winter for sowing as soon as the weather warms up in August. Sterilisation used to be done by burning brushwood on the beds and by fumigating the soil with chemicals against nematodes. But it has now proved easier and more effective—if somewhat more expensive—to fumigate the soil under plastic covers with methyl bromide, which is effective against nematodes, weeds, and some diseases.

After sowing, the beds must be watered carefully each day for nearly two months, by which time the seedlings are about 6 in. high, and are ready for hardening, by withholding water, in order to get seedlings strong enough to stand transplanting into rather dry soil in a hot

Harvesting. Leaves are normally reaped two at a time from each plant once a week. Reaping lasts for from six to ten weeks

Curing. Bunches of reaped leaves are tied with string to sticks 4 ft. long and hung in tiers in the curing barn. There are roughly 100 leaves per stick and 700 sticks to the average barn. One barn is needed for every 4–5 acres of tobacco

Suckering is an important operation. Suckers grow from each leaf axil, and during the reaping season these must be removed every week in order to force the growth into the leaves themselves and so improve yield and quality. The work is usually done by women and adds greatly to labour requirements

The whole of the Rhodesian tobacco crop is auctioned in Salisbury on three auction floors, which are the biggest and most efficient in the world. Each bale (of about 200 lb.) is individually auctioned at the amazing speed of one bale every seven seconds

sun. During this time the seedlings are sprayed twice weekly against diseases and pests, mostly with copper sprays. Good seedbeds are the foundation of good, even crops.

After ploughing and discing, the lands are drawn into ridges about 3 ft. 9 in. apart and 1 ft. high, and the fertilizer is usually applied mechanically at the same time in a double band beneath each ridge. Ridging is not usually considered necessary in the United States and yet is basic to good crops in Rhodesia. Plants are spaced at 2 ft. intervals along the ridge, which gives a population of about 6000 plants in every acre, each requiring individual care and attention throughout its life if it is to realise anything like its potential value of 1s.

It has been found that best results usually follow planting out just before the rains break in early November, after seven months' drought, and because the soil is powder dry at that time it is necessary to set each plant with up to half a gallon of water. It is advisable to add insecticide—usually aldrin or dieldrin—to the planting

water as a precaution against soil pests. Although laborious, this planting with water does ensure good stands in spite of late or light rains, and it is probably the chief reason for the better stands and higher yields now being obtained.

Only five years ago water planting was almost unknown on farms in Rhodesia, and planting was a most harrowing period as the growers anxiously waited for adequate rains to fall—and the onset of rains might vary over a period of several weeks from year to year. Now the guesswork is gone, and good stands are assured despite adverse weather.

From the end of October, when planting commences, until the New Year and the start of reaping, each plant in every field needs individual attention at each of about ten field operations, from replanting seedings that have died to cultivating and weeding, and lastly topping or removing the flower buds and topmost leaves to ensure the proper growth of the remaining leaves.

Sandy Soils the Best

The best tobacco is grown on sandy soils of low fertility; on rich, heavy soils the darker green leaf does not yellow properly on maturity, and the quality is poor. The great dilemma in fertilizing the crop is to decide on how to compromise between sufficient fertilizer to get a good yield, while ensuring that the supply of nitrogen will run out about the time that the flowers are topped and reaping commences. Naturally, the optimum amount of nitrogen to apply depends on many factors, most of which are impossible to measure or predict—such as on the amount of unrotted organic matter in the soil, and especially on the amount of rain that is going to fall between planting and reaping. Nitrogen enough for a dry year would be much too little in a very wet year. An average application would be about 20 lb. of N, 120 lb. of P, 100 lb. of K, 20 lb. of MgO, and a few pounds of boron, which is incorporated in the commercial fertilizer mixtures.

Leaves are generally reaped two at a time from each plant once a week. Each plant has 12–20 leaves after topping, so that reaping usually extends over 6–10 weeks on each land. The reaped leaf is then tied with string on sticks 4 ft. long to be hung in tiers in the curing barns. There are roughly 100 leaves per stick, 700 sticks per barn, but naturally this varies. The leaf must be handled with great care at every operation from reaping to grading to prevent breakage. One barn is needed for every 4–5 acres of tobacco.

During the reaping season, after topping, suckers grow from each leaf axil, and these must be removed every week in order to force the growth into the leaves themselves and so improve yield and quality. Suckering greatly adds to the already increased labour requirements during the reaping season, and usually necessitates the employment of women labourers who do not work for most of the rest of the year. In America suckers are suppressed by the application of chemicals, but in Rhodesia the lower labour costs enable the job to be done better and cheaper by hand.

The curing process is interesting, and takes about a week for each barnful of tobacco. For the first two days the temperature is kept at about 100° F. with a high humidity until the still living leaf has attained a lemon yellow colour. At the critical times, which only experience can tell, the temperature is raised progressively to 160° and ventilation is provided to drive off the moisture and dry the leaf, thus fixing the colour of the cured leaf at the best bright lemon, orange or mahogany colour for the type of tobacco. The higher the leaf on the plant, the darker its colour and the stronger its smoking qualities. Unfortunately curing is nothing like as simple as here described, every cure being slightly different from any other. It is probably at this stage that experience counts for more than at any other stage in tobacco growing.

After curing, the leaf is tinder dry and extremely brittle, so that it must be softened by steaming or introducing moist air until it can be handled without breakage. It is then untied and stored in bales or stacks until reaping is over and grading commences. This is usually about the end of March, and from then on all the farm's activities centre on the grading shed.

Preparing for Auction

Here the whole crop is progressively removed from storage and sorted leaf by leaf according to colour, texture and length. After grading the leaf is tied into "hands" by binding the butts of a handful of leaves with another leaf of the same grade to facilitate subsequent handlings up to the final manufacture into cigarettes. The tied leaf is then pressed into bales, wrapped in waterproof paper, and sewn in hessian for despatch to the auction floors. Rhodesian tobacco is probably the best graded and presented of any on the world markets.

Sales start in April and continue until the whole crop has been sold, usually in September, by which time next year's seedlings are showing green in the beds.

While the crop is not growing or being reaped it is being graded, which means that there is virtually no off season to tobacco growing. The labour requirement is high. With better management and labour-saving methods the requirement is being reduced from the old standard of about one labourer per acre to one labourer to each acre and a half, or even to every two acres. The rush season is during January to March, when reaping, curing, untying and suckering are in progress. Grading is laborious but unrushed, and the only slack season is after grading and before planting; but even then seedbeds demand constant attention, and usually new lands are being cleared. The tempo increases again from just before planting until reaping.

February IN THE GARDEN

GREENHOUSE PLANTS

By PERCY THROWER

When the sun shines at this time of year the temperature in the greenhouse makes an upward spurt, for the sun is gaining more power day by day. The days are lengthening too, and with the extra daylight plants in greenhouses with some means of artificial heat are beginning to grow.

With the aid of a warm propagating frame, now is the time to begin propagating for a cheerful summer and autumn display in the greenhouse. The colourful leaves of the nettle-like **coleus** plant are always decorative and help to set off many of our flowering plants. There are two ways of growing this plant, either from seed or from cuttings. When growing from seed, you are uncertain what colours you will get in the leaves; a good strain of seed will produce plants with many bright colours. The seed will need a temperature of 55–60° F. in the frame for successful germination. The seed is very tiny and must be only just covered with the seed-sowing compost or with sand.

Cuttings taken now from plants saved from last year or plants rooted from cuttings in the autumn will produce plants exactly the same as those from which you take the cuttings. My plants have been overwintered at the warmest end of the greenhouse, and there are numerous young shoots beginning to grow on them. These young shoots make ideal cuttings, and if kept in the same temperature as I have recommended for the seed they will have formed roots in about two weeks.

The young shoots need to be no more than 2 in. long. After cutting them off, trim off two or three leaves from the base and cut straight across immediately below a leaf joint. Four cuttings can be put in round the inside edge of a 3 in. flower pot filled with a mixture of equal parts fine soil, granulated peat and coarse sand.

Each pot must be given enough water to soak the soil mixture right through, and they can then go into the propagating frame. If the atmosphere inside the frame is kept humid, the cuttings will not flag and will soon form their roots.

Fuchsias are ideal greenhouse plants too, flowering continuously from May to October. If not already, there will soon be plenty of young shoots on the plants which have been more or less dormant since the autumn. These young shoots make good cuttings too, and if treated in the same way as the coleus they will be well rooted in about three weeks. Once rooted these make very rapid growth and by May will be large plants beginning to flower in flower pots 6 in. in diameter. By careful watering and weekly feeding with a soluble fertilizer throughout the summer they will never be without flowers.

Last year's plants can be pruned and repotted. All side branches can be cut back to a bud within an inch of the main stem and they will soon start into growth again. While they are dormant, I shake the soil from the roots and pot them in the smallest pots into which I can get the roots without undue cramping. I can then pot them into larger pots as they make their new growth and they never have to be potted into very large pots, which take up too much greenhouse space.

On last year's **geranium** plants there are young shoots which will make good cuttings. I like them to be 3–4 in. long.

These can be put into flower pots in the same soil mixture, but there is no need to put them into the propagating frame; they can be stood on the greenhouse staging to root so long as the temperature does not drop below 45°. Geraniums will flower in the greenhouse continually from April to November, and plants from cuttings put in now can be used either for planting out at the end of May or for flowering inside.

Ferns always put the finishing touch to the decorative appearance of the greenhouse. Maidenhair ferns and others such as the pteris ferns can be divided and repotted now and they will soon grow into handsome foliage plants.